

10500862 3/20/06

L4 ANSWER 1 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1265326 CAPLUS  
DOCUMENT NUMBER: 144:24241  
TITLE: Process for the distillative separation of aqueous amine solutions  
INVENTOR(S): Steffens, Friedhelm; Buse, Rainer; Brady, Bill  
PATENT ASSIGNEE(S): Bayer Materials AG, Germany  
SOURCE: U.S. Pat. Appl. Publ., 7 pp.  
CODEN: USXXCO  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

| PATENT NO.  | KIND | DATE     | APPLICATION NO.      | DATE     |
|---|------|----------|----------------------|----------|
| US 2005263385   | A1   | 20051201 | US 2005-138991       | 20050526 |
| DE 102004026626   | A1   | 20051229 | DE 2004-102004026626 | 20040601 |
| EP 1602640  | A1   | 20051207 | EP 2005-10842        | 20050519 |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, BA, HR, IS, YU |      |          |                      |          |
| JP 2005343898   | A2   | 20051215 | JP 2005-161772       | 20050601 |
| DE 2004-102004026626A 20040601  |      |          |                      |          |

PRIORITY APPLN. INFO.:  
AB The invention relates to an energy efficient process for the distillative working-up of aqueous amine solns. that occur in the catalytic hydrogenation of nitroarom. compds. In this process, the amine is freed from water and also the water is obtained free from amine and low-boiling compds. and the concentrated low-boiling compds. are obtained.

L4 ANSWER 2 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:49012 CAPLUS  
DOCUMENT NUMBER: 138:385095  
TITLE: Palladium complex of poly(4-vinylpyridine-co-acrylic acid) for homogeneous hydrogenation of aromatic nitro compounds  
AUTHOR(S): Xi, Xiangli; Liu, Yingliang; Shi, Jun; Cao, Shaokui  
CORPORATE SOURCE: Department of Materials Engineering, Zhengzhou University, Zhengzhou, 450052, Peop. Rep. China  
SOURCE: Journal of Molecular Catalysis A: Chemical (2003), 192(1-2), 1-7  
CODEN: JMCCF2; ISSN: 1381-1169  
PUBLISHER: Elsevier Science B.V.  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
OTHER SOURCE(S): CASREACT 138:385095  
AB Copolymers, poly(4-vinylpyridine-co-acrylic acid) (PVPA), with different composition were synthesized, and their palladium complexes were prepared  
The catalytic properties of the palladium complex for the hydrogenation of aromatic nitro compds. were investigated. The palladium complex of PVPA can form a homogeneous system in ethanol. The optimum catalytic activity for hydrogenation of nitrobenzene was obtained when the molar content of 4-vinylpyridine (VPy) units in PVPA was 57.5% and VPy/Pd molar ratio was 6. The presence of 0.1 mol/L KOH can promote the catalytic activity to a great extent. In most cases, the hydrogenation of aromatic nitro compds. yields the corresponding aniline compds. almost quant. The catalyst shows especially good activity for the hydrogenation of nitrophenols and nitroanisoles. The catalytic stability was also examined

REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 3 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1999:808693 CAPLUS  
DOCUMENT NUMBER: 132:37259  
TITLE: Improved process for hydrogenation of dinitrotoluene to toluenediamine by monolith catalyst containing nickel and palladium  
INVENTOR(S): Machado, Reinaldo Mario; Parrillo, David Joseph; Boehma, Richard Peter; Broekhuis, Robert Roger  
PATENT ASSIGNEE(S): Air Products and Chemicals, Inc., USA  
SOURCE: U.S., 10 pp.  
CODEN: USXXAM  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

| PATENT NO.  | KIND | DATE     | APPLICATION NO. | DATE     |
|---|------|----------|-----------------|----------|
| US 6005143  | A    | 19991221 | US 1998-130936  | 19980807 |
| KR 2000017021   | A    | 20000325 | KR 1999-31780   | 19990803 |
| EP 978505   | A2   | 20000209 | EP 1999-115409  | 19990804 |
| EP 978505   | A3   | 20001102 |                 |          |
| EP 978505   | B1   | 20030416 |                 |          |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO |      |          |                 |          |
| BR 9903380  | A    | 20001017 | BR 1999-3380    | 19990804 |
| CN 1245163  | A    | 20000223 | CN 1999-117513  | 19990806 |
| JP 2000080061   | A2   | 20000321 | JP 1999-223566  | 19990806 |
| US 1998-130936 A 19980807   |      |          |                 |          |

PRIORITY APPLN. INFO.:  
AB This invention relates to an improvement in a process for hydrogenating a nitroarom. composition namely dinitrotoluene by contacting the dinitrotoluene with hydrogen in a reactor employing a monolith catalyst system. Broadly the improvement resides in the continuous, essentially solventless, adiabatic hydrogenation of dinitrotoluene to toluenediamine in a plug flow reactor system incorporating the monolith catalyst. The process generally comprises the steps: introducing a feedstock comprised of dinitrotoluene and reaction product components continuously into the reactor and said feedstock having <30 weight% of a solvent, carrying out the hydrogenation of dinitrotoluene to toluenediamine under adiabatic conditions; and, continuously removing hydrogenated reaction product from the reactor. The concentration of dinitrotoluene in the feedstock to the reactor inlet ranges from 0.2 to 3 weight%. The inlet temperature to the reactor is from 100° to 140°. The monolith catalyst has the catalytic metals nickel and palladium incorporated. Thus, hydrogenation of dinitrotoluene to toluenediamine by the above procedure in a cylindrical monolith reactor (approx. 5 m high and 0.5 m in diameter with a com. 400 CPI cordierite monolith supporting square shaped cells with 10% alumina washcoat and a catalyst metal loading of 10% nickel and 1% palladium based on the washcoat) at inlet feed rate 2.00 mol/m<sup>3</sup>/s, temperature 110°, inlet dinitrotoluene concentration 142 mol/m<sup>3</sup>, total pressure 1600 kPa, residence time 71 s, catalyst activity 0.3/s, and exit temperature 159 gave exit dinitrotoluene concentration 2 ppm, dinitrotoluene conversion 100%, final dinitrotoluene yield to toluenediamine 97.4%, and byproduct 2.6 weight%, compared to 0, 100%, 83.7%, and 16.3 weight%, resp., for the same process using inlet dinitrotoluene concentration 237 mol/m<sup>3</sup>, residence time 119 s, and exit temperature

L4 ANSWER 3 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN (Continued)

180° instead.  
REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 4 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1998:208515 CAPLUS  
 DOCUMENT NUMBER: 128:257227  
 TITLE: Hydrogenation process for the preparation of substituted aromatic amino compounds  
 INVENTOR(S): Baumeister, Peter; Siegrist, Urs; Studer, Martin  
 PATENT ASSIGNEE(S): Novartis A.-G., Switz.; Baumeister, Peter; Siegrist, Urs; Studer, Martin  
 SOURCE: PCT Int. Appl., 35 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.  | KIND   | DATE     | APPLICATION NO. | DATE       |
|---|--|----------|-----------------|------------|
| WO 9813331  | A1   | 19980402 | WO 1997-EP5151  | 19970919   |
| W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW   |  |          |                 |            |
| NW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG  |  |          |                 |            |
| CA 2265527  | AA   | 19980402 | CA 1997-2265527 | 19970919   |
| CA 2265527  | C  | 20060207 |                 |            |
| AU 9745557  | A1   | 19980417 | AU 1997-45557   | 19970919   |
| EP 931053   | A1   | 19990728 | EP 1997-943873  | 19970919   |
| EP 931053   | B1   | 20030416 |                 |            |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI   |  |          |                 |            |
| BR 9712109  | A  | 19990831 | BR 1997-12108   | 19970919   |
| JP 2001501201   | T2   | 20010130 | JP 1998-515242  | 19970919   |
| AT 237577   | B  | 20030515 | AT 1997-943873  | 19970919   |
| US 6258982  | B1   | 20010710 | US 1999-254586  | 19990310   |
| KR 200004835  | A  | 20000725 | KR 1999-702447  | 19990322   |
| PRIORITY APPL. INFO.: WO 1997-EP5151  |  |          | A 19960923      | W 19970919 |
| OTHER SOURCE(S): CASREACT 128:257227; MARPAT 128:257227   |  |          |                 |            |
| AB Aromatic amino compds. containing directly on the aryl ring or in a side chain   |  |          |                 |            |
| <p>≥1 entities that may also undergo hydrogenation, e.g., C multiple bonds or nitrile, imino or carbonyl groups, are prepared by catalytic hydrogenation of the corresponding nitroarom. compds. in the presence of P-modified noble metal catalysts. The use of modified noble metal catalysts for hydrogenation of nitroarom. compds. is also claimed. V compds. used as cocatalysts suppress formation of hydroxylamines. Thus, 2-(2-chloro-5-aminobenzoyloxy)-2-methylpropionic acid allyl ester was prepared in 98% yield by hydrogenation of its 5-nitrobenzoyloxy-precursor in the presence of hypophosphorous acid-modified Pt/C catalyst and active C impregnated with NH4VO3 as cocatalyst (prepn given).</p> |  |          |                 |            |
| REFERENCE COUNT: 2  | THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT |          |                 |            |

L4 ANSWER 5 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1997:343846 CAPLUS  
 DOCUMENT NUMBER: 127:65390  
 TITLE: Hydrogenation of nitroaromatics by polymer-anchored bimetallic palladium-ruthenium and palladium-platinum catalysts under mild conditions  
 AUTHOR(S): Yu, Zhengkun; Liao, Shijian; Xu, Yun; Yang, Bin; Yu, Daorong  
 CORPORATE SOURCE: Dalian Institute of Chemical Physics, Chinese Academy of Sciences, P.O. Box 110, Dalian, 116023, Peop. Rep. China  
 SOURCE: Journal of Molecular Catalysis A: Chemical (1997), 120(1-3), 247-255  
 CODEN: JMCCF2; ISSN: 1381-1169  
 PUBLISHER: Elsevier  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 OTHER SOURCE(S): CASREACT 127:65390  
 AB Polymer-anchored monometallic palladium catalyst PVP-PdCl2 [PVP = poly(N-vinyl-2-pyrrolidone)] exhibits very high activity for the hydrogenation of p-chloronitrobenzene (CNB) to aniline (AN) in the presence of base at 65°C and atmospheric pressure. In this case, the substrate is rapidly hydrodechlorinated to nitrobenzene (NB) which is then reduced to AN. Using the polymer-anchored bimetallic palladium-ruthenium catalyst, PVP-PdCl2-RuCl3, and in the presence of 1.0 mol% of sodium acetate, a strong synergic effect gives rise to a remarkable increase of the selectivity for p-chloroaniline (CAN) and the maximum selectivity of CAN is up to 94%. For the hydrogenation of the non-halo-substituted nitroarom. to the corresponding aromatic amines, the monometallic PVP-PdCl2 catalyst only shows mild or poor activity, but the colloidal polymer-anchored bimetallic palladium-platinum catalyst, PVP-Pd-1/4Pt, exhibits very high activity and selectivity.  
 REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 4 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN (Continued)

L4 ANSWER 6 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1997:127373 CAPLUS  
 DOCUMENT NUMBER: 126:132878  
 TITLE: Process and catalyst for the manufacture of aromatic amines by gas-phase hydrogenation  
 INVENTOR(S): Langer, Reinhard; Buysch, Hans-Josef; Pentling, Ursula  
 PATENT ASSIGNEE(S): Bayer A.-G., Germany  
 SOURCE: Eur. Pat. Appl., 8 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.   | KIND | DATE     | APPLICATION NO.  | DATE     |
|--|------|----------|------------------|----------|
| EP 748789  | A2   | 19961218 | EP 1996-108855   | 19960603 |
| EP 748789  | A3   | 19980408 |                  |          |
| EP 748789  | B1   | 19991013 |                  |          |
| R: BE, CH, DE, ES, FR, GB, IT, LI, NL, PT, SE  |      |          |                  |          |
| DE 19521670  | A1   | 19961219 | DE 1995-19521670 | 19950614 |
| ES 2139276   | T3   | 20000201 | ES 1996-108855   | 19960603 |
| CA 2178700   | AA   | 19961215 | CA 1996-2178700  | 19960610 |
| JP 09003013  | A2   | 19970107 | JP 1996-170701   | 19960611 |
| PL 183134  | B1   | 20020531 | PL 1996-314750   | 19960612 |
| BR 9602790   | A    | 19980908 | BR 1996-2790     | 19960613 |
| CZ 287872  | B6   | 20010214 | CZ 1996-1739     | 19960613 |
| CN 1142487   | A    | 19970212 | CN 1996-106185   | 19960614 |
| CN 1071308   | B    | 20010919 |                  |          |
| PRIORITY APPL. INFO.: DE 1995-19521670   |      |          | A 19950614       |          |
| OTHER SOURCE(S): MARPAT 126:132878   |      |          |                  |          |
| AB Anilines RR1CGH3NH2 (R = H, Me, Et, amino; R1 = H, Me, Et) are produced by hydrogenation of nitroarom. compds. R1R2CGH3NO2 (R1 as above; R2 = NO2, H, Me, Et) with H in the gas phase using Pd on graphite or graphitized coke as catalyst support. Thus, PhNH2 was produced with selectivity 99.49% by passing PhNO2 and H (81:1 H/PhNO2 mol. ratio) through a tubular reactor packed with granular graphite-supported catalyst containing 2% Pd and operating under adiabatic conditions with inlet temperature 201°. |      |          |                  |          |

## L4 ANSWER 7 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1997:124378 CAPLUS  
 DOCUMENT NUMBER: 126:132877  
 TITLE: Process and catalyst for the manufacture of aromatic amines by gas-phase hydrogenation  
 INVENTOR(S): Langer, Reinhard; Buysch, Hans-Josef; Pentling, Ursula  
 PATENT ASSIGNER(S): Bayer A.-G., Germany  
 SOURCE: Eur. Pat. Appl., 8 pp.  
 CODEN: EPXKXW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.                                    | KIND | DATE     | APPLICATION NO.  | DATE        |
|---|------|----------|------------------|-------------|
| EP 748790                                     | A2   | 19961218 | EP 1996-108856   | 19960603    |
| EP 748790                                     | A3   | 19980408 |                  |             |
| EP 748790                                     | B1   | 19991020 |                  |             |
| R: DE, CH, DE, ES, FR, GB, IT, LI, NL, PT, SE |      |          |                  |             |
| DE 19521587                                   | A1   | 19961219 | DE 1995-19521587 | 19950614    |
| ES 2139277                                    | T3   | 20000201 | ES 1996-108856   | 19960603    |
| US 5679858                                    | A    | 19971021 | US 1996-660622   | 19960606    |
| CA 2178701                                    | AA   | 19961215 | CA 1996-2178701  | 19960610    |
| TW 418182                                     | B    | 20010111 | TW 1996-85106931 | 19960610    |
| JP 09003012                                   | A2   | 19970107 | JP 1996-170700   | 19960611    |
| PL 183111                                     | B1   | 20020531 | PL 1996-314749   | 19960612    |
| BR 9602789                                    | A    | 19960908 | BR 1996-2789     | 19960613    |
| CZ 287873                                     | B6   | 20010214 | CZ 1996-1740     | 19960613    |
| CN 1143073                                    | A    | 19970219 | CN 1996-106186   | 19960614    |
| CN 1119318                                    | B    | 20030827 |                  |             |
| US 5962365                                    | A    | 19991005 | US 1997-878592   | 19970619    |
| PRIORITY APPLN. INFO.:                        |      |          | DE 1995-19521587 | A 19950614  |
|   |      |          | US 1996-660622   | A3 19960606 |

## OTHER SOURCE(S):

MARPAT 126:132877  
 AB Anilines R<sub>1</sub>CH<sub>2</sub>NH<sub>2</sub> (R = H, Me, Et, amino; R<sub>1</sub> = H, Me, Et) are produced by hydrogenation of nitroarom. compds. R<sub>1</sub>CH<sub>2</sub>CHN<sub>2</sub> (R<sub>1</sub> = NO<sub>2</sub>, H, Me, Et; R<sub>1</sub> as above) with H in the gas phase using Pd and Pb on graphite or graphitized coke as catalyst support. Thus, PhNH<sub>2</sub> was produced with selectivity >99.8% by passing H/PhNO<sub>2</sub> mixture (80:1 H/PhNO<sub>2</sub> mol. ratio) through a tubular reactor packed with granular graphite-supported catalyst containing 2% Pd and 0.5% Pb and operating under adiabatic conditions with inlet temperature 202°.

## L4 ANSWER 8 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:723561 CAPLUS  
 DOCUMENT NUMBER: 126:46896  
 TITLE: Bimetallic synergistic effect of polymer-supported catalysts in the hydrogenation of nitroaromatics  
 AUTHOR(S): Yang, Bin; Xu, Yun; Liao, Shijian; Yu, Daorong  
 CORPORATE SOURCE: Dalian Institute of Chemical Physics, The Chinese Academy of Sciences, Dalian, 116023, Peop. Rep. China  
 SOURCE: Fenzi Cuihua (1996), 10(5), 339-344  
 CODEN: FECHUH; ISSN: 1001-3555  
 PUBLISHER: Zhongguo Kexueyuan Lanzhou Xuehu Wuli Yanjiusuo  
 DOCUMENT TYPE: Journal  
 LANGUAGE: Chinese

AB The catalytic behaviors of poly-N-vinyl-2-pyrrolidone (PVP)-supported palladium monometallic catalyst Pd/PVP and palladium-based bimetallic catalysts (1-m)Pd-mM/PVP in the hydrogenation of nitroarom. were studied. The catalyst Pd/PVP shows high catalytic activity and selectivity for the formation of aromatic amines in the hydrogenation of nitrobenzene, m-dinitrobenzene etc., but the catalyst shows low activity even no reactivity for other arom., for example, the hydrogenation of p-nitrobenzoic acid. Among the second metal compds. added, hexachlorophosphoric acid is the best one. The effects of the preparative methods, the molar ratio of palladium to platinum, the solvent used and the amount of base on the hydrogenation of nitrobenzene catalyzed by the palladium-platinum bimetallic catalysts were investigated. Catalyst 0.80 Pd-0.20 Pt/PVP exhibits the highest catalytic activity in the hydrogenation of nitrobenzene among a series of bimetallic catalyst prepared in alc.-water solution with alternative molar ratios of Pd to Pt. These two metals exhibit obvious synergic effect and the TOFmax of the catalyst can amount to 190 min<sup>-1</sup>. The catalyst also show high catalytic activity and selectivity for the formation of amines in the hydrogenation of other nitroarom. .. e.g. the TOFmax can be up to 216 min<sup>-1</sup> in the hydrogenation of m-nitrobenzoic acid.

## L4 ANSWER 9 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:300154 CAPLUS  
 DOCUMENT NUMBER: 125:85985  
 TITLE: Hydrogenation and hydroamination on palladium compounds immobilized in polymeric matrices  
 INVENTOR(S): Klyuev, M. V.; Nasibulin, A. A.  
 CORPORATE SOURCE: Ivanovo State Univ., Ivanovo, 153025, Russia  
 SOURCE: Kinetics and Catalysis (Translation of Kinetika i Kataliz) (1996), 37(2), 215-228  
 CODEN: KICAA8; ISSN: 0023-1584  
 PUBLISHER: MAIK Nauka/Interperiodica  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Small (Pd5-7) clusters strongly immobilized by polymeric matrices are obtained during reduction of palladium-containing anionites by mol. hydrogen or sodium borohydride. The catalytic properties of the systems obtained are examined both in the hydrogenation reactions of unsatd. compds. (primarily of the nitroarom. series) and in the hydrogenation amination of aldehydes by amines or nitro compds. under mild conditions (1 atm of H<sub>2</sub>, 20-50°C, organic solvents). Palladium-containing anionites proved to be more selective and stable than Pd/C, especially in the case of complex substrates. The yield

of the desired amine reached 98-99%. The effect of a polymeric matrix on the rates and, in some cases, on the routes of catalytic reactions is revealed and discussed. The kinetics of hydrogenation and hydroamination on palladium-containing anionites is investigated, and their mechanisms are proposed.

## L4 ANSWER 10 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:262060 CAPLUS  
 DOCUMENT NUMBER: 124:289003  
 TITLE: Selective preparation of fluorinated aromatic amines with exceptionally low content of defluorinated material.  
 INVENTOR(S): Kiel, Wolfgang; Pastz, Klaus-Christian; Mueller, Nikolaus; Kissener, Wolfram  
 PATENT ASSIGNER(S): Bayer A.-G., Germany  
 SOURCE: Ger. Offen., 7 pp.  
 CODEN: GWXXEX  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.             | KIND | DATE     | APPLICATION NO. | DATE       |
|------------------------|------|----------|-----------------|------------|
| DE 4428535             | A1   | 19960215 | DE 1994-4428535 | 19940812   |
| EP 700895              | A2   | 19960313 | EP 1995-112060  | 19950801   |
| EP 700895              | A3   | 19960626 |                 |            |
| R: DE, FR, GB, IT      |      |          |                 |            |
| JP 08059572            | A2   | 19960305 | JP 1995-219465  | 19950807   |
| PRIORITY APPLN. INFO.: |      |          | DE 1994-4428535 | A 19940812 |

OTHER SOURCE(S): CASREACT 124:289003; MARPAT 124:289003  
 AB Fluorinated aromatic nitro compds. were hydrogenated in the liquid phase in the presence of catalysts selected from Ni, Co, and noble metals and their compds. and R<sub>1</sub>SO<sub>n</sub>R<sub>2</sub> [R<sub>1</sub>, R<sub>2</sub> = H, alkyl, hydroxyalkyl, carboxyalkyl, Ph, alkylcarbonyl; R<sub>1</sub>R<sub>2</sub> = CH<sub>2</sub>CHCH<sub>2</sub>CH<sub>2</sub>, (CH<sub>2</sub>)<sub>4</sub>, (CH<sub>2</sub>)<sub>5</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>; X = O, S; n = 0, 1]. Thus, 5-fluoro-2-nitrobenzoic acid was hydrogenated in aqueous NaOH (pH 10) in an autoclave at 50-60° and 80 bar H in the presence of Pt/C and 0.6% bis(2-hydroxyethyl) sulfide to give >98% pure 5-fluorocanthranilic acid product containing 0.002% defluorinated material.

L4 ANSWER 11 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1989:616279 CAPLUS  
 DOCUMENT NUMBER: 111:216279  
 TITLE: Studies on hydrogenation with nickel catalysts. VI. Catalytic properties of colloidal nickel for hydrogenation. Catalytic hydrogenation of nitro and halogen compounds  
 AUTHOR(S): Sakai, Mutsuji; Yasui, Toshikazu; Fujimoto, Shinpei; Tomita, Masahiro; Sakakibara, Yasumasa; Uchino, Norito  
 CORPORATE SOURCE: Dep. Polym. Sci. Eng., Kyoto Inst. Technol., Kyoto, 606, Japan  
 SOURCE: Nippon Kagaku Kaishi (1989), (9), 1642-4  
 CODEN: NKAB8; ISSN: 0369-4577  
 DOCUMENT TYPE: Journal  
 LANGUAGE: Japanese  
 AB Colloidal Ni was easily prepared by reaction of NiBr<sub>2</sub> with Zn powder. It was an active catalyst for hydrogenation of aromatic nitro compds. and of halobenzenes. Aromatic nitro compds. were hydrogenated to give the corresponding amines in high yields in the presence of the colloidal Ni under 1 atm H<sub>2</sub>. p-Bromonitrobenzene was hydrogenated successively to afford aniline via p-bromosaniline. p-Bromosaniline and p-chloroaniline were reduced to aniline in good yields. It was suggested that the amino moiety assisted the adsorption of the substrate on the surface of the metal and that it acted as an acceptor of hydrogen halide. The hydrogenation of halobenzenes gave benzene in the presence of aniline. The reactivity of halobenzenes was in the order; I>Br>Cl.

L4 ANSWER 12 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1988:40035 CAPLUS  
 DOCUMENT NUMBER: 108:40035  
 TITLE: Selective catalytic hydrogenation of nitrobenzene to hydrazobenzene  
 AUTHOR(S): Karwa, Shrikant L.; Rajadhyaksha, Rajeev A.  
 CORPORATE SOURCE: Dep. Chem. Technol., Univ. Bombay, Bombay, 400 019, India  
 SOURCE: Industrial & Engineering Chemistry Research (1988), 27(1), 21-4  
 CODEN: IECRED; ISSN: 0888-5885  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB Pt-C significantly more selective catalyst than Pd-C for conversion of PhNO<sub>2</sub> to PhNHNHPh. Addition of DMSO improved the selectivity, although the rates of various reactions were considerably reduced. The hydrogenation of a few substituted nitroaroms. was also investigated. The presence of electron-releasing substituents reduced the selectivity to hydrazobenzene. Complete hydrogenation to aromatic amines was the only side reaction.

L4 ANSWER 13 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1987:409320 CAPLUS  
 DOCUMENT NUMBER: 107:9320  
 TITLE: Catalytic reduction process for the production of aromatic amino compounds  
 INVENTOR(S): Twigg, Martyn Vincent  
 PATENT ASSIGNEE(S): Imperial Chemical Industries PLC, UK  
 SOURCE: Eur. Pat. Appl., 13 pp.  
 CODEN: EFXKDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.   | KIND | DATE     | APPLICATION NO. | DATE       |
|--|------|----------|-----------------|------------|
| EP 211545  | A2   | 19870225 | EP 1986-305465  | 19860716   |
| EP 211545  | A3   | 19870429 |                 |            |
| EP 211545  | B1   | 19900418 |                 |            |
| R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE  |      |          |                 |            |
| AT 52077   | E    | 19900515 | AT 1986-305465  | 19860716   |
| US 4777295   | A    | 19881011 | US 1986-887569  | 19860721   |
| CA 1259632   | A1   | 19890919 | CA 1986-514598  | 19860724   |
| DK 8603646   | A    | 19870202 | DK 1986-3646    | 19860731   |
| JP 62053945  | A2   | 19870309 | JP 1986-181815  | 19860801   |
| PRIORITY APPLN. INFO.:   |      |          |                 |            |
| AB Aromatic nitro compds. are reduced to the corresponding amines with H in the presence of a catalyst containing Co and/or Ni and ≥1 difficultly reducible metal oxide with decreased phenylcyclohexylamine (I) byproduct formation. The Co and/or Ni comprise 80-98% of the total number of atoms in the catalyst excluding O and C. A catalyst, consisting of 93.1:3.7:3.1:0.1 (weight ratio) NiO-Al <sub>2</sub> O <sub>3</sub> -CoO <sub>2</sub> -Na <sub>2</sub> O (prepared by precipitation of the metal nitrates with Na <sub>2</sub> CO <sub>3</sub> followed by calcination at 350° for 4 h and ignition at 900°), was reduced at 450° and used for reduction of PhNO <sub>2</sub> , resulting in 3.9 g/h PhNH <sub>2</sub> /g catalyst and <0.1 g/h I/g catalyst, compared with 4.4 and ≥1.9 for a standard (probably Ni/kieselguhr) catalyst. |      |          |                 |            |
|  |      |          | GB 1985-19422   | A 19850801 |
|  |      |          | GB 1986-2329    | A 19860130 |
|  |      |          | EP 1986-305465  | A 19860716 |

L4 ANSWER 14 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1987:52099 CAPLUS  
 DOCUMENT NUMBER: 106:52099  
 TITLE: Reactor for continuous production of aromatic amines  
 INVENTOR(S): Zimmermann, Reiner; Kinza, Horst; Alscher, Gerhard  
 PATENT ASSIGNEE(S): Akademie der Wissenschaften der DDR, Ger. Dem. Rep.  
 SOURCE: Ger. (East), 6 pp.  
 CODEN: GEXKAS  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.  | KIND | DATE     | APPLICATION NO. | DATE     |
|---|------|----------|-----------------|----------|
| DD 229940   | A1   | 19851120 | DD 1984-271257  | 19841220 |
| PRIORITY APPLN. INFO.:  |      |          |                 |          |
| AB A reactor for the continuous preparation of aromatic amines by liquid-phase catalytic hydrogenation of nitroarom. compds. has a combination of loop and tubular characteristics, whereby the catalyst bed has ≥1 electrode on the nitroarom. feed side allowing the regulation of the feed rate, thus avoiding damage to the catalyst and increasing its lifetime. The reactor is operated at pressures ≤3 MPa. Thus, 300 g/h of a 10% 2-O <sub>2</sub> N-C <sub>6</sub> H <sub>4</sub> NH <sub>2</sub> solution was hydrogenated at 70°/0.1 MPa over 700 g SiO <sub>2</sub> -supported Ni catalyst at linear H feed rate 1 cm/s, yielding a o-C <sub>6</sub> H <sub>4</sub> (NH <sub>2</sub> ) <sub>2</sub> product concentration of 8%, at a control potential of +100 mV. |      |          |                 |          |
|   |      |          | DD 1984-271257  | 19841220 |

L4 ANSWER 15 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1984:408324 CAPLUS  
 DOCUMENT NUMBER: 105:8324  
 TITLE: Catalytic hydrogenation in the liquid phase  
 INVENTOR(S): Wolter, Gerhard; Grahn, Eberhard; Kaerst, Helmut;  
 Lucke, Siegfried; Mechel, Kurt; Wilhelm, Ottmar;  
 Zoelch, Lothar  
 PATENT ASSIGNEE(S): VEB Chemiekombinat Bitterfeld, Ger. Dem. Rep.  
 SOURCE: Ger. (East), 15 pp.  
 CODEN: GEXXAS  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.     | KIND | DATE     | APPLICATION NO. | DATE     |
|----------------|------|----------|-----------------|----------|
| DD 226872      | A1   | 19850904 | DD 1984-265720  | 19840727 |
| DD 1984-265720 |      |          | DD 1984-265720  | 19840727 |

PRIORITY APPL. INFO.:  
 AB Continuous catalytic liquid-phase hydrogenation, especially strongly exothermic, (e.g. hydrogenation of nitroarom. compds. to amines), is carried out quasi-kinetically in tube reactors with heating and cooling mantles in which the 3-phase reactants (gas-solid-liquid) are mixed by pulsation at frequency <30,000/min (preferably 30-3000/min) with variable amplitude. Addnl. static mixing elements can be placed along all or part of the length of the reactor. Thus, 4-nitrotoluene was hydrogenated at 100°/3 MPa, and frequency (at 5 mm amplitude) 300/min in MeOH over a supported Ni catalyst in a 1-L tube reactor to give 96% 4-toluidine.

L4 ANSWER 16 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1981:3461 CAPLUS  
 DOCUMENT NUMBER: 94:3461  
 TITLE: Noble metal catalysis in industrial hydrogenations.  
 Part I. Palladium solubility and hydrogen availability  
 AUTHOR(S): Bird, A. J.; Thompson, D. T.  
 CORPORATE SOURCE: Res. Cent., Johnson Matthey and Co., Ltd., Reading, RG4 9NH, UK  
 SOURCE: Catalysis in Organic Syntheses (1980), Volume Date 1978, 7th, 61-106  
 CODEN: CAOSDF; ISSN: 0197-534X  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB Solubility of Pd from heterogeneous catalysts during hydrogenation is a problem, particularly when nitro-aroms. are reduced to aromatic amines. Aqueous NH<sub>3</sub>-NH<sub>4</sub>Cl with Pd/C catalysts was chosen as a model system. Pd was leached from the support with both reduced (metallic Pd) and unreduced (PdO) catalysts. The Pd becomes insol. if it is converted to PdH<sub>2</sub> with either gaseous H<sub>2</sub> or a compound which decomps. on the catalyst to given H. Pd is made insol. if the metal is maintained as a hydride during the catalytic reaction. This can only occur if the rate of H arrival at the metal surface is greater than the rate of consumption, i.e. the reaction is controlled by surface kinetics and not by a parameter of mass transport. This conclusion was tested by examining the effect of mass transport on Pd solubility during the hydrogenation of 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Me over Pd/C.

L4 ANSWER 17 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1974:535689 CAPLUS  
 DOCUMENT NUMBER: 81:135689  
 TITLE: Homogeneous catalysts useful in the reduction of nitroaromatics to amines  
 INVENTOR(S): Knifton, John F.; Suggitt, Robert M.  
 PATENT ASSIGNEE(S): Texaco Inc.  
 SOURCE: U.S., 10 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 4  
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE     | APPLICATION NO. | DATE       |
|------------|------|----------|-----------------|------------|
| US 3832401 | A    | 19740827 | US 1971-121132  | 19710304   |
| GB 1340458 | A    | 19731212 | GB 1972-8738    | 19720225   |
| CA 1004688 | A1   | 19770201 | CA 1972-135747  | 19720228   |
| BE 780150  | A1   | 19720904 | BE 1972-114632  | 19720302   |
| NL 7202741 | A    | 19720906 | NL 1972-2741    | 19720302   |
| FR 2127970 | A5   | 19721013 | FR 1972-7426    | 19720303   |
| IT 949857  | A    | 19730611 | IT 1972-21379   | 19720303   |
| BR 7201259 | A    | 19751230 | BR 1972-1259    | 19720303   |
| DE 2210564 | A    | 19720914 | DE 1972-2210564 | 19720304   |
| US 3903167 | A    | 19750902 | US 1974-462912  | 19740422   |
| US 3906045 | A    | 19750916 | US 1974-462833  | 19740422   |
|            |      |          | US 1971-121132  | A 19710304 |
|            |      |          | US 1971-193204  | A 19711027 |

PRIORITY APPL. INFO.:  
 AB Nitroaromatics, e.g., PhNO<sub>2</sub>, p- or o-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>Me, 2,6-, 2,5-, 2,4-, 3,5- or 3,4-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NO<sub>2</sub>, p-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, p-ClC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub>, and p-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>-COMe, were hydrogenated with at least 50% conversion and 80% amine selectivity over homogeneous Ru or Fe catalyst complexes, e.g., RuCl<sub>2</sub>(PPh<sub>3</sub>)<sub>3</sub>, Fe(CO)<sub>3</sub>(PPh<sub>3</sub>)<sub>2</sub>, Fe(CO)<sub>3</sub>(AsPh<sub>3</sub>)<sub>2</sub>, Fe(CO)<sub>5</sub>, RuCl<sub>2</sub>(AsPh<sub>3</sub>)<sub>3</sub> and RuCl<sub>2</sub>(AsEt<sub>3</sub>)<sub>3</sub>. Seventy-one examples were given.

L4 ANSWER 18 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1972:24811 CAPLUS  
 DOCUMENT NUMBER: 76:24811  
 TITLE: Aniline production by dual function catalysis  
 AUTHOR(S): Polinski, Leon M.; Harvey, Ernest A.  
 CORPORATE SOURCE: Am. Cyanamid, Bound Brook, NJ, USA  
 SOURCE: Industrial & Engineering Chemistry Product Research and Development (1971), 10(4), 365-9  
 CODEN: IEPRA6; ISSN: 0196-4321  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB Polyfunctional heterogeneous catalysis is responsible for petroleum reforming of hydrocarbons, and the theory elucidated and developed by Weiss for these reactions is well established. These same concepts are used to devise a polyfunctional catalyst system for simultaneously steam reforming and hydrogenating nitroaromatic compds. (e.g., nitrobenzene) to aromatic amines (e.g., aniline) in a fixed bed vapor phase catalytic system. This avoids the large exotherms present in a straight hydrogenation (the exotherm is still present but offset by the endotherm of the reforming reaction) and allows two heretofore sep. consecutive catalytic reaction processes to occur simultaneously in a single unit despite unfavorable equilibrium conditions for the steam reforming reaction. The complexities of the kinetics are examined

10500862 3/20/06

L4 ANSWER 19 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1968:95486 CAPLUS  
 DOCUMENT NUMBER: 68:95486  
 TITLE: Preparation of aromatic amines by the catalytic hydrogenation of aromatic nitro compounds  
 INVENTOR(S): Dorell, Frederick S.; Greenfield, Harold  
 PATENT ASSIGNEE(S): Uniroyal, Inc.  
 SOURCE: U.S., 4 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

|    | PATENT NO.  | KIND | DATE     | APPLICATION NO. | DATE     |
|----|---|------|----------|-----------------|----------|
| GI | US 3350450  |      | 19671031 | US 1964-364280  | 19630812 |
| AB | <p>The process comprises: (a) reductive hydrogenation of a chloro-substituted aromatic nitro compound; (b) reductive alkylation of the primary amine obtained in (a) with H and a lower alkyl or aryl aldehyde, lower aliphatic or alkyl aryl ketone to obtain the corresponding chloro-substituted amine. Steps (a) and (b) were carried out in the presence of a sulfide of Pb, Pt, Rh, or Co. Thus, 10 g. p-BrC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub>, 240 ml. MeOH, and 1.4 g. PtS<sub>2</sub>-C (5%) were charged to a Magne-Dash autoclave, which was sealed, purged first with N<sub>2</sub>, then with H<sub>2</sub>, heated 1 hr. with agitation at 100-30°/500-800 psig. H<sub>2</sub> and then 6.5 hrs. at 130°. At this point the absorption of H<sub>2</sub> stopped abruptly at .appr.99% of the theoretical amount required for reduction. The reaction mixture was filtered, the filtrate made alkaline with NaOH, concentrated, treated with C<sub>6</sub>H<sub>6</sub>, and the remaining MeOH removed by distillation to a liquid (pot) temperature of 205°/atmospheric pressure to leave 99.5% p-BrC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, m. 58.5-61.5°. A mixture m.p. with an authentic sample gave no depression; neither PhNH<sub>2</sub> nor any nitro compound was detected by gas-liquid chromatog. in either the distillate or the residue. p-ClC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub> (31.5 g.), 158 g. Me<sub>2</sub>CO, and 2.5 g. Rh-C 5% under 50 psig. H<sub>2</sub>S and 1300 psig. H<sub>2</sub> were heated 4.4 hrs. with agitation at 180°/1200-1400 psig., and the mixture worked up to give 100% p-ClC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>-iso (I), b<sub>5</sub> 100°, m. 8-9°, n<sub>D</sub> 1.5470; HCl salt m. 159.5-60.5° (C<sub>6</sub>H<sub>6</sub>). Similarly obtained over PtS<sub>2</sub> in 99.5% yield was 2,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>, m. 48-9.5°. Results obtained from the reduction of halobenzenes over the above catalysts are given. It is useful as a post-emergence herbicide to kill narrow-leaf grasses in an area containing broad-leaf flora and narrow-leaf grasses.</p> |      |          |                 |          |

L4 ANSWER 20 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1946:31222 CAPLUS  
 DOCUMENT NUMBER: 40:31222  
 ORIGINAL REFERENCE NO.: 40:6098b-d  
 TITLE: Reduction of aromatic nitro compounds  
 INVENTOR(S): Mason, Ralph B.  
 PATENT ASSIGNEE(S): Standard Oil Development Co.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Unavailable  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

|    | PATENT NO.   | KIND | DATE     | APPLICATION NO. | DATE     |
|----|--|------|----------|-----------------|----------|
| AB | US 2402423   |      | 19460618 | US 1943-508066  | 19431028 |
| AB | <p>A continuous 2-stage process for the catalytic reduction of aromatic nitro compds. to the corresponding amines is described. In the 1st stage, a com. nitroaromatic (containing polynitro compds.) is hydrogenated under mild temperature conditions (below about 300°F.) to reduce the polynitro compds., and in the 2nd stage, higher temps. (up to 550 °F.) are used to complete the hydrogenation. The temperature should be low enough to prevent reduction of the aromatic nucleus. Mol. sulfide supported on charcoal is a satisfactory catalyst for reduction of the nitroxylenes. The process, described in detail (one diagram), is said to give over 99% conversion of nitro compds. to the corresponding amines with a maximum of safety and control. The mylidines improve the performance of aviation gasoline.</p> |      |          |                 |          |

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